

Securing, Protecting, and Restoring our Kansas Reservoirs

Background & Issue

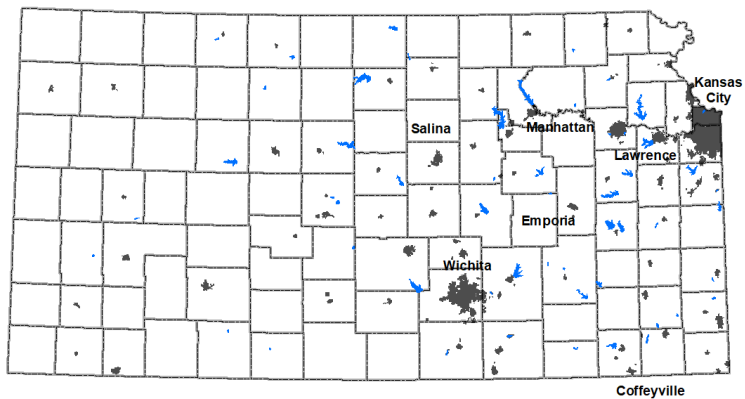
Surface water reservoirs serve to protect the public interest and facilitate multiple diverse beneficial uses within the state of Kansas. The future of Kansas reservoirs will impact all water user groups, as they act as water supply for the agricultural, domestic, industrial, municipal, and recreational water user groups.

As a source of municipal water supply, over two thirds of the state's population are served from municipal water diversions downstream of reservoirs, dependent on Kansas reservoirs to maintain streamflow for diversions, maintaining sufficient water quality for human uses, and providing drought resiliency. For many rural communities, the water supply supported by reservoir releases is the only source of water through periods of prolonged drought. Loss of future reservoir water supply will inhibit rural revitalization efforts and be a regressive expense burden for lower income Kansans, as water suppliers incur elevated costs for water sourcing.

Reservoirs in the state support the water supply needs of a substantial amount of industry and commerce within the state, with a large amount of the state's industrial production being supplied by municipalities, rural water districts, or direct intakes of surface water. Reservoirs supply water to electrical generating facilities, aeronautical production, refinery operations, cement production, and a growing amount of irrigated agricultural acres, all of which require reliable quantity and quality of water supply to continue providing their economic benefits to the state.

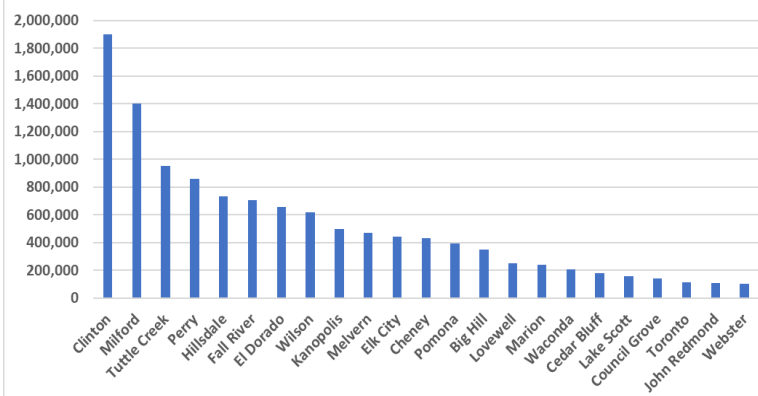
Recreation is a growing economic role of reservoirs, with several million visitors annually participating in on water and on shore activities, providing millions of dollars in economic benefits from visitor expenditures within the state. With more cities looking to develop riverfront recreational areas, maintaining reservoir water supply will allow for sufficient stream flow for recreational activities.

Kansas cities and large reservoirs



Above: Reservoirs over 500 surface acres indicated in blue and cities with populations over 2,500 in black. Many rural communities and areas in the eastern half of the state receive water supply from rural water districts that are supplied from reservoirs and can distribute costs.

2018 Visitation at Federal and State Reservoir Facilities



The reservoirs serve to reduce the impacts of the variable Kansas climate, reducing the impacts of flooding events, that in the recent past would cause widespread damage to agricultural production, loss of homes, livelihoods, and human life. At times, the reservoirs serve as the sole source of water supply through prolonged drought for many Kansans, by using storage to support instream uses and maintaining an adequate flow of water to user's intakes. See the section on Reducing our Vulnerability to Extreme Events for more information on the impacts of climate variability in Kansas.

There are several varied issues impacting the future of the Kansas reservoirs:

1. Storage capacity is continually being lost to sedimentation in reservoirs. Land within the watersheds of reservoirs are losing soil, soil which is then transported to the reservoirs through varied climatic events. Soil is trapped in the reservoirs which reduces water supply available for future economic growth, future populations, and water supply needs through extreme climate events. Reduced reservoir water storage capacity leads to increased risk of loss for all water user groups dependent on reservoir water supply, flood protection, and water quality support.
2. The state's growing unfunded liability and inability to financially support its current contractual obligations for the operation of existing reservoir water supplies, which suppresses the ability to develop and plan for an adequate water supply for future Kansans. Lack of commitment to manage current financial obligations will inhibit the ability to plan and respond to future water supply challenges across the state, with a significant proportion of the state water plan funding coming from user fees that are supported by reservoir water supply. This will leave the state unable to adequately fund the development, protection, and control of water resources necessary to support anticipated water uses as stated in K.S.A. 82a-928.
3. The increase in the number of reservoirs experiencing Harmful Algal Bloom events, as well as an increase in event frequency within reservoirs as they continue to accumulate nutrients from natural and agricultural practices within their drainage basins, increasing the cost of living for Kansans downstream, reducing economic benefits, and impacting recreational interests. Impacting rural revitalization efforts in communities supplied by reservoir water supply.

Management Approach

Without intervention, the current course will lead to the state being unable to satisfy its statutory obligations to the people of the state. Specifically, not having developed or secured control of sufficient supplies of water to meet the future needs of the people of the state.

As the source of municipal and industrial water for more than two-thirds of the state's population, supporting widespread irrigation use below their dams, and supporting water quality in streams and rivers during periods of low flow. Reservoirs in Kansas play a key role in water security and drought resiliency planning, both by providing sufficient quantity of water to meet demands and being a source of water to maintain water quality to drinking water, industrial, or environmental standards during times of degraded natural flow conditions. As seen in 2018 and 2020 along the Kansas River, natural sources of chlorides can degrade water quality leading to impacts on municipal and industrial uses. It is necessary to maintain adequate quantities of higher quality water in storage within Water Quality pools

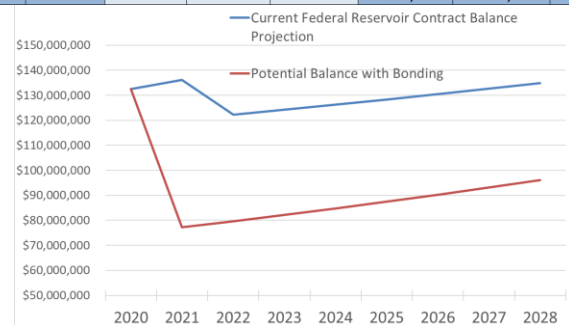
secured within federal reservoirs to respond to these events and maintain supply security to water users of the state.

Reservoir operations are conducted through multiple Lake and River Regulation Manuals overseen by the United States Army Corps of Engineers (USACE), operational agreements with the multiple Water Assurance Districts, and Water Access Districts. With flood pool operations being managed by the USACE and in coordination with out of state downstream river systems. Rights to water storage within the conservation or multi-purpose pools of 14 Federal reservoirs has been contracted for use by the state of Kansas. Multiple cities and agricultural irrigation groups also have water storage agreements in place, namely the City of Wichita and Cheney reservoir. This multi-purpose pool storage is operated in collaboration with the Federal Government to meet the needs of the many diverse water users and instream water quality demands.

For multiple reservoirs, there exists a financial liability that will need to be addressed by the state of Kansas, specifically where the state has agreed to the purchase of reservoir storage volume but has not needed to call the use of the storage into service. As demands rise, storage volumes are lost to reservoir sedimentation, and the storage is needed to meet Kansas needs, the state will need to make the financial payments to call additional water supply into service as shown below and as outlined in the 2017 Public Water Supply Program Comprehensive Capital Development Plan.

FUTURE USE STORAGE - Call-in Schedule															
Calendar Year	Big Hill Reservoir			Clinton Reservoir			Hillsdale Reservoir			Milford Reservoir			Perry Reservoir		
	AF Call	Total AF	% in Service	AF Call	Total AF	% in Service	AF Call	Total AF	% in Service	AF Call	Total AF	% in Service	AF Call	Total AF	% in Service
2020		9,200	35.80		53,520	60.00		16,783	31.67		101,650	33.88		25,000	16.67
2024															
2027															
2028				35,680	89,200	100.00									
2029	16,500	25,700	100.00												
2030							36,217	53,000	100.00						
2034										198,350	300,000	100.00			
2041													125,000	150,000	100.00

With historically low interest rates, the state is evaluating the financial benefits of entering into the current bond market to reduce financial obligations with the federal government for reservoir water supply. Opportunities exist to reduce long-term interest rate obligations, and make remaining payments to call some needed reservoir water supply into service. Taking on this financial challenge at the current time will save Kansas water users and the state millions of dollars, while addressing the water supply needs for several regions of the state.



Top: Schedule in which the state will be calling reservoir storage volumes into service to meet demands of water supply needs or contractual obligations with the federal government.

Bottom: Current federal reservoir contract debt obligations and one potential debt bonding projection.

The reservoirs of the state were built with expected operational lifespans. There is a projected loss of storage as sediment carried by inflowing rivers and creeks is trapped within the reservoirs, with some Kansas reservoirs trapping over 98% of the sediment carried from their headwaters. This makes for future conflicts where the amount of water able to be retained in reservoir storage will be insufficient to meet the demands of multiple user groups and puts the state in the position of being unable to supply adequate amounts of water for anticipated future uses or in contrast to the requirements of K.S.A. 82a-928.

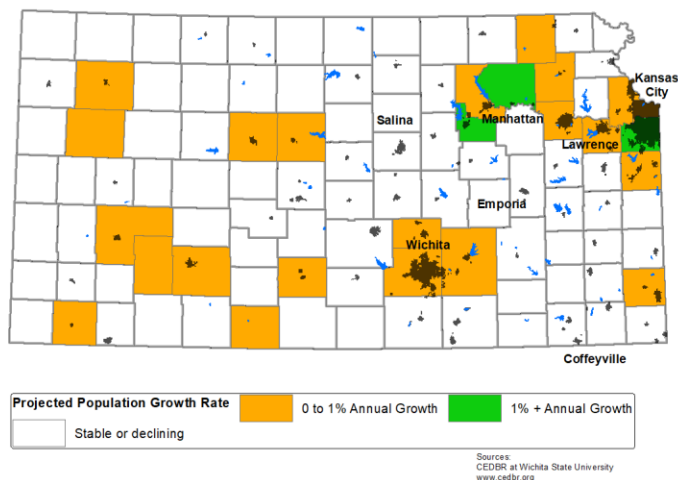
As stated in the Kansas Water Vision, there have been targeted investments in the watersheds above multiple reservoirs used for water supply purposes, such as stream bank stabilization projects, water shed dam construction, and increased support for soil health initiatives. However, the acres of agricultural lands that have had conservation practices implemented and the number of streambank stabilization sites completed, with past and current levels of funding, has not remediated the reservoir sedimentation issues.

Top: Counties with projected population growth and current large reservoir sites. (Reservoir over 500 surface acres)

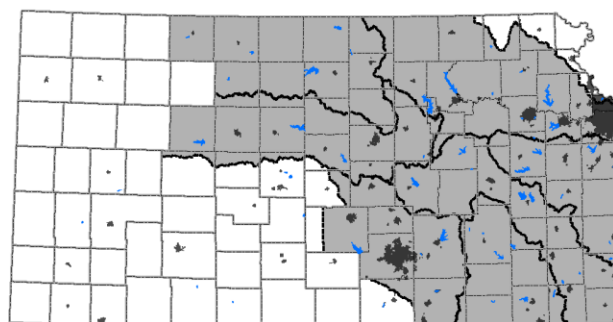
Middle: Summer 2020 Harmful Algae Bloom through Milford Reservoir. Increased frequency of algal blooms will increase water treatment costs and cost of living for downstream water users, while also impacting recreational users and their economic activity in the state.

Bottom: Regional Advisory Committee regions supporting increased reservoir investment with targeted Action Plan development.

Reservoir locations and population growth



Regional Advisory Committees supporting increased reservoir investment

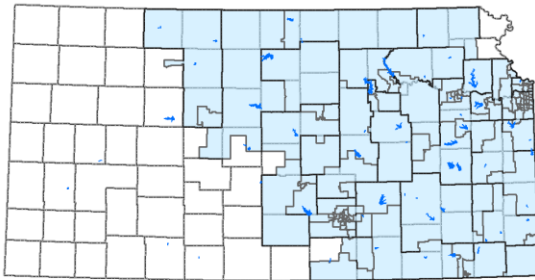


As identified by the Blue Ribbon Water Funding Task Force for Water Resource Management additional funding support is needed to adequately reduce sedimentation rates to protect future water supply. The funding task force consisted of a diverse group of stakeholders, legislators, and government officials, who identified a funding need of \$21 million per year

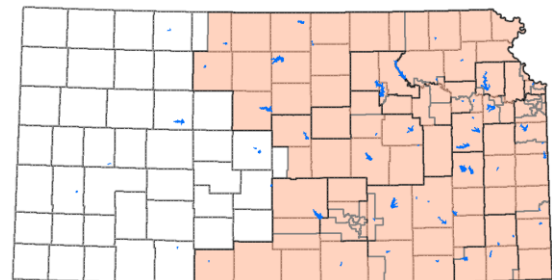
to support conservation and remediation activities to secure future reservoir water supplies.

(www.kwo.ks.gov/water-vision-water-plan/water-vision) Regional Advisory committee action plans for the Equus-Walnut (Goals 3 & 4), Kansas (Goals 1, 3, & 5), Marais des Cygnes (Goals 1 & 2), Neosho (Goals 1 & 3), Smoky Hill-Saline (Goal 3), Solomon-Republican (Goal 2), and Verdigris (Goals 1 & 3) basins support and advocate for investments to secure and develop reservoir water supplies.

Kansas Legislature:
House Districts and reservoir water supply goals



Kansas Legislature:
Senate Districts and reservoir water supply goals



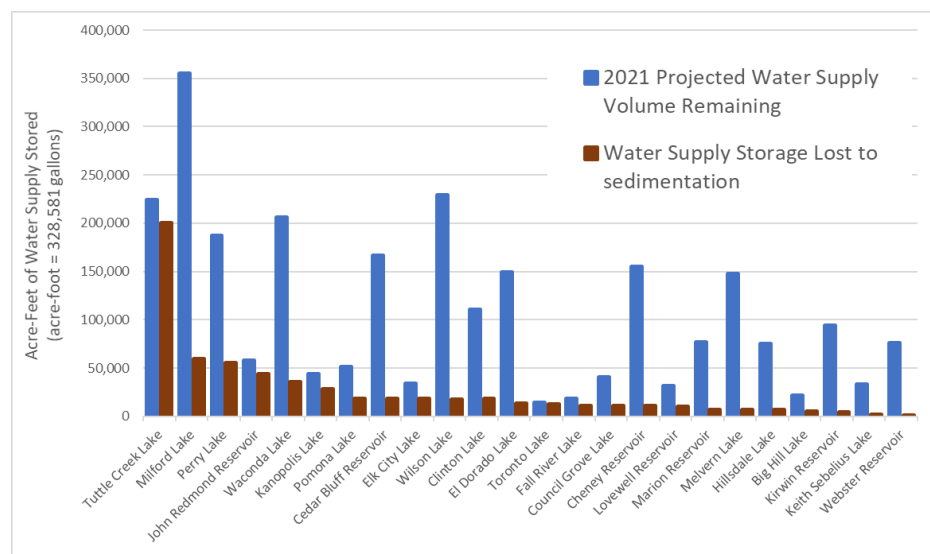
Above: Regional Advisory Committees supporting increased investment into water supply reservoirs cover all or part of 111 of 125 State House Districts and 36 of 40 State Senate Districts.

While the initial reservoir designs included projections for the storage loss and operational plans designed to account for climate variations, it is of growing importance for future water supply and recreational planning to fund adequate levels of reservoir research. Adequate funding of reservoir research is necessary to measure the impacts of conservation initiatives that have been funded with taxpayer and water user fee support. This includes studying the sedimentation reduction provided by streambank stabilization sites, conducting harmful algal bloom pilot studies with monitoring, and measuring the impact of soil health initiatives on the nutrient and sediment loads entering the reservoirs of the state.

Reservoir research support is needed to:

- better quantify the sedimentation issue
- identify if the reservoirs are infilling as initially projected or responses to behavioral changes within the watersheds
- impacts of large-scale climatic events, such as the extensive flood events of 2019.

Below: Amount of reservoir water supply storage remaining and lost to reservoir sedimentation.



Water users along the Kansas River will financially, environmentally, and recreationally benefit from having additional storage designated as Water Quality within Milford and Perry reservoir multi-purpose storage pools. With it dedicated to support the low flow quantity and quality requirements of all water user groups dependent on reservoir supported streamflow and instream uses.

Reservoirs of the state, including Federal reservoirs, multi-purpose small lakes, municipal reservoirs, and watershed dams all play a role in reducing the impacts of extreme flood events on the state and its citizens. Following the prolonged, and in some regions of the state, record flooding of 2019, there were identified several improvements the state should make to prepare before the next destructive flood event. See the Reducing Our Vulnerability to Extreme Events section for more information on flood impacts to Kansans.

With flood operations being conducted in accordance with river and reservoir operations manuals by the USACE, there is an opportunity for the state to invest into the review and development of recommendations to be incorporated into operational manuals. The ongoing Kansas River Reservoirs Flood and Sediment study is a collaborative initiative between the USACE and state to review current reservoir conditions, needs, and operations, while also planning for the future water supply needs, challenges, and limitations within the Smoky Hill-Saline, Solomon-Republican, and Kansas Regional Planning Areas. With some incorporation of how future climatic variability may impact water supply and recreational reservoir uses, including analysis of what happens if no actions are taken to sustain the usable lifetimes of the federal reservoirs.

Map with Reservoirs identified for WQ and low flow modifications. Include RWD map of impacted suppliers

Map of irrigated acres below reservoirs

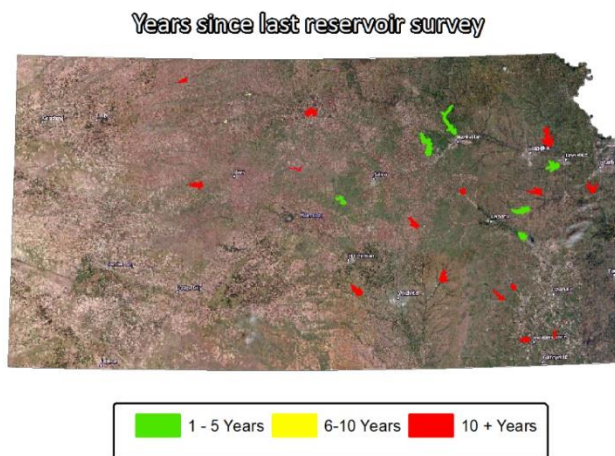
Measuring Success

To identify and measure the impact of investments in supporting reservoir goals, there needs to be increased observation and measurement of the condition of the reservoirs. Observing changes to sedimentation and stream channel geomorphology through additional and more frequent data collection will help agricultural, industrial, municipal, and recreational water user groups better plan for their future use demands and capital investments.

Additional reservoir monitoring and research will help to better predict, monitor, and respond to Harmful Algal Bloom events, that impact recreational and water supply user groups. And further development in algal bloom response and mitigation techniques.

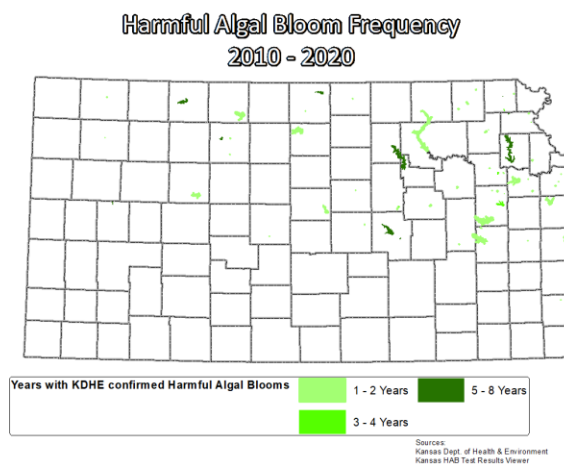
It is necessary to incorporate metrics both, quantitative and qualitative into future water resource plan development to monitor whether public funds and user fees are being utilized productively and efficiently to support the future of reservoirs within the state. With the requirements of Performance Based Budgeting, there has been increased incorporation of regionally supported budget initiatives into State Water Plan Budget proposals and development of performance metrics for expenditures. The Kansas Water Authority approved the Kansas Water Plan Budget Guidelines in January 2020, stating how funds should be used to:

- meet statutory obligations
- tied to projects in the 50 year water vision or state water plan
- supported by appropriate metrics and benchmarks
- that a water user group's fees be allocated to reasonably support that water user group's future water supply, as seen with sedimentation reduction projects being funded above reservoirs that provide water supply for downstream water user groups and fee payers
- allow the flexibility to fund expenditures that can be justified to be in response to an emerging threat to water resources or public health.



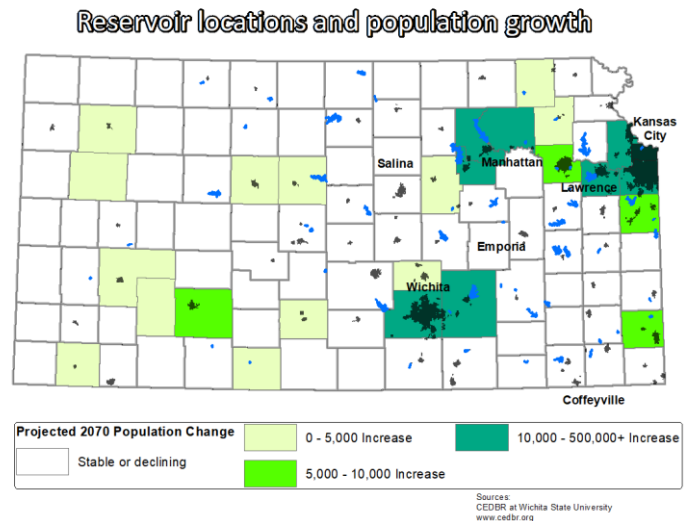
Above: Years since last reservoir volumetric survey has been completed. With reservoir research funding level, the state is working to conduct more frequent reservoir surveys to monitor impacts to reservoir sedimentation from practices within watersheds.

Below: Reservoirs with Harmful Algal Blooms confirmed by Kansas Department of Health and Environment testing for 2010 – 2020.



Recommended Actions and Strategies

Though the reservoirs in the state were designed with a finite lifetime to their water supply capabilities, the needs of a growing Kansas population and agricultural use downstream of reservoirs do not have finite lifetimes. Multiple regions of the state need to have reservoir water supply secured, protected, or restored to meet the water needs of the future.



Securing: the water supply for future Kansans

1. Utilize the current financial climate and low borrowing rates to issue bonds to secure reservoir storage. Complete principal and interest payments to the federal government to fulfill contractual obligations.
2. Collaborate with USACE to increase Water Quality pool allocations where needed, to ensure sufficient flows to support instream uses and maintain water quality for users.
3. Work to increase efficiency of reservoir operations through low flow release modifications and operating reservoirs as a system. As data resources and climate conditions allow, incorporate Forecast Informed Reservoir Operations to increase water supply resiliency and efficiency.

Protecting: reservoir water supply by reducing sedimentation and nutrient loading rates

1. Fund and implement strategies supported by Regional Advisory Committees to reduce sedimentation and nutrient loading rates within water supply reservoirs. In reservoirs where conservation alone will not satisfy future water supply demands, work towards implementation of active sediment management strategies.
2. Support watershed conservation practices, with soil health initiatives, streambank stabilization, and riparian corridor restoration being some methods outlined in the Kansas Water Vision and Regional Advisory Committee Action Plans.
3. The Blue Ribbon Water Funding Task Force for Water Resource Management identified some funding levels for conservation practices that have not been supported thus far. Additionally, Regional Advisory Committees are having discussions on new methods to fund reservoir conservation initiatives, with some privately funded initiatives being implemented.

Restoring: continued reservoir research, data collection, and sediment management projects

1. Support Harmful Algal Bloom data collection and remediation projects.
2. Study benefits of watershed conservation practice implementation on sedimentation and nutrient loading rates, utilize budgetary guidelines and performance metrics to direct future funding sources to those that are shown to improve reservoir conditions.

3. Engage in active sediment management studies with federal partners as cost share and funding opportunities arise.
4. Support reservoir research priorities as developed by the Kansas Water Resource Research coordination group.
5. In regions where it is infeasible to restore water supply storage in current reservoirs, explore additional storage possibilities with the construction of multipurpose small lakes to alleviate regional water supply issues.